AWRA 2011 ANNUAL WATER RESOURCES CONFERENCE
Albuquerque, New Mexico
November 7-10, 2011 **Copyright © 2011 AWRA**

HYDRAULIC AND GEOSPATIAL ANALYSES OF STREAM ENGINEERING AND HABITAT RESTORATION NEAR LOS LUNAS, NM

Stephen Kissock *

ABSTRACT: Stream restoration is a complex process encompassing multiple disciplines and organizations to achieve specific, immediate and long-term goals. This project studies one completed habitat restoration project in terms of its engineering and biological sustainability using geospatial analysis procedures not widely applied to these goals. These procedures include adjustment of a digital terrain model for hydraulic accuracy, the use of the digital terrain model and aerial imagery for the digitization of features used in hydraulic modeling, and the geospatial analyses of the resulting hydraulic model parameters of depth, velocity, and shear stress to map habitat preferences and discuss sustainability. Methods presented here have application to a broad range of habitat restoration projects, from project planning stages to post-completion monitoring. The Los Lunas Habitat Restoration site was begun when a fire decimated the riparian vegetation in the area, opening the door to the site being overtaken by non-native and invasive species proliferating in the area. The goals of the project were to construct habitat preferential to the endangered species, the Rio Grande silvery minnow (*Hybognathus amarus*) and the Southwestern willow flycatcher (*Empidonax traillii extimus*), by restoring a natural inundation regime to the overbank area. This inundation regime provides spawning and rearing habitat for the minnow in addition to promoting native vegetation over non-native and invasive vegetation. To evaluate the success of the project, hydraulic modeling and geospatial analysis procedures are undertaken using the most current digital terrain model (collected using LiDAR), a readily available hydraulic modeling software package (HEC-RAS), and geographic information systems (ArcMap). Features used in hydraulic modeling were manually digitized in most cases although some were assisted using the spatial extent of the LiDAR point cloud. Data exchange between HEC-RAS and ArcMap allowed iterative refinement of the hydraulic model and detailed investigation of results. This detailed spatial investigation is a novel approach to the analysis of a hydraulic model for biological functionality and sustainability of the site.

* Hydraulic Engineer, US Army Corps of Engineers, Operations 4101 Jefferson Plaza NE, Albuquerque, NM 87109 USA, Phone: 505-342-3291, Email: stephen.r.kissock@usace.army.mil,